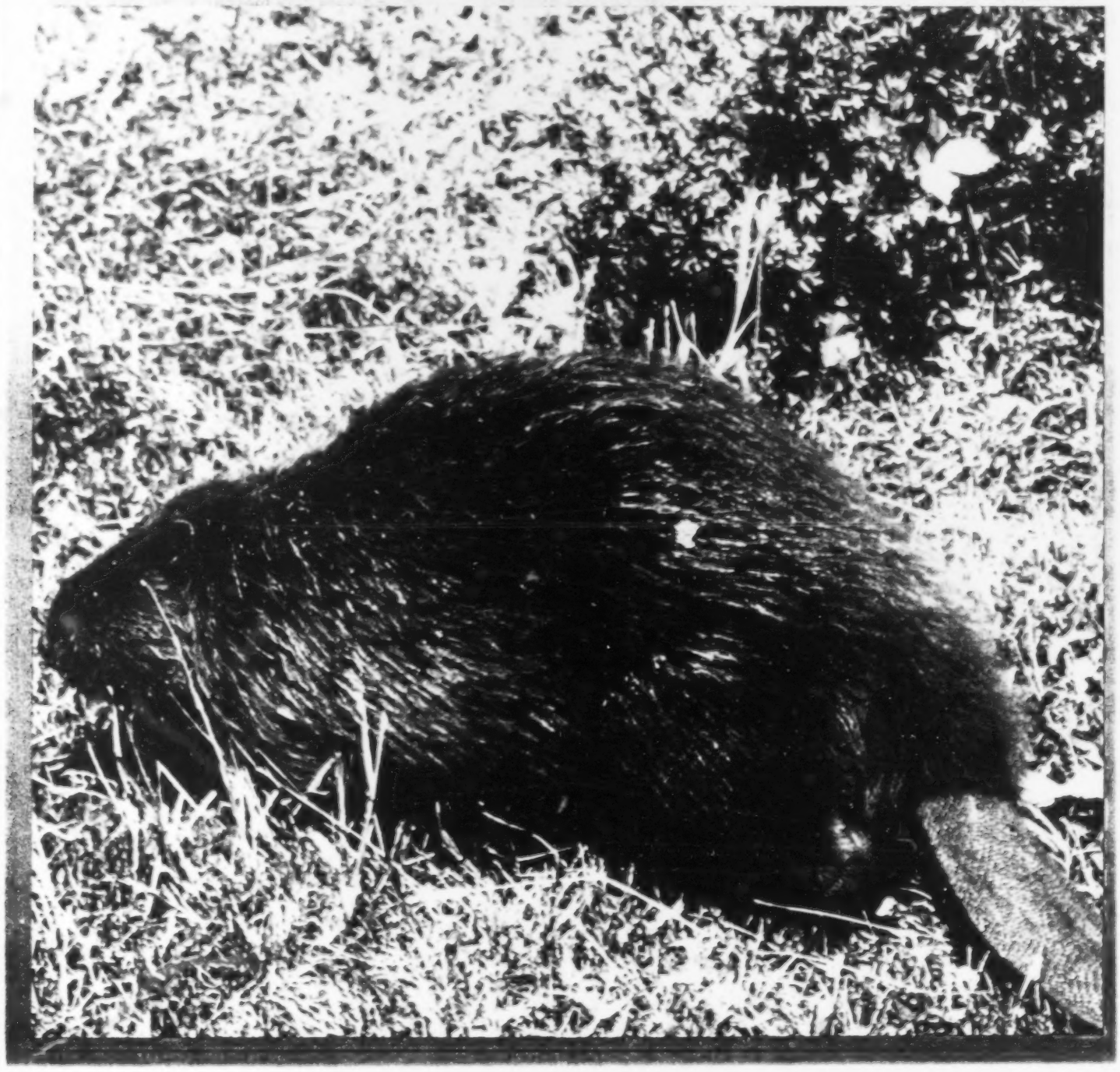


No other animal has influenced a nation's history to the extent that the beaver *Castor canadensis* has influenced the history of Canada. When Europeans began to settle in northern North America, beaver pelts were the prize that lured them farther and farther into the wilderness. Champlain pushed westward to extend the beaver trade in 1613. The travels of Radisson and Des Groseilliers in the Lake Superior and James Bay regions during 1659–61 were fur-trading ventures. The Hudson's Bay Company was founded in 1670 chiefly to trade for beaver fur. The Nor'westers, operating out of Montreal after 1783, went to the farthest reaches of Canada in search of beaver. Canadians now celebrate the beaver as a national symbol on stamps, coins, and emblems; in addition, literally hundreds of Canadian lakes, towns, rivers, and hill ranges bear the name of this interesting rodent.

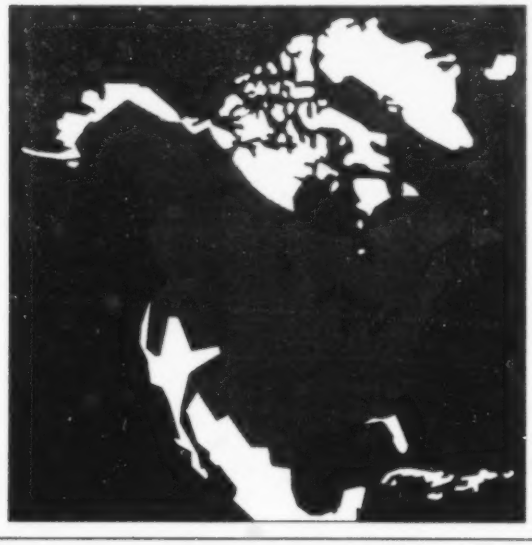
Distribution

Beavers are found throughout Canada, north to the mouths of the Mackenzie and Coppermine rivers on the Arctic Ocean. Most common in forested areas, beavers also expand into unforested habitats, where there are watercourses bordered by deciduous (broad-leaved) trees or shrubs. Thus, in western Canada, they are found along streams on the dry prairie. Even in the tundra, beavers occasionally colonize shrubby water edges where water is deep enough to allow for food storage and access to the den under the winter ice.

In the rest of North America, the beaver's range extends throughout southwestern Alaska and most of the states south of the 49th parallel. The beaver has been exterminated in some states, and in practically all of its former range in northern Mexico.

Until the 12th century the European beaver *Castor fiber* was found in England and Wales and throughout Eurasia as far east as the Yenisei River in central U.S.S.R. and as far south as Spain and Italy. It became extinct in the British Isles about that time. By the early 1900s only a few remained in Eurasia, mainly in small colonies on the remote reaches of northern rivers in Finland and the Soviet Union.

Through conservation efforts, beaver are now well established in Finland, Norway, Sweden, and the Soviet Union, and are on the road to recovery in Germany, France, Poland, Austria, and Switzerland. Canadian beaver introduced to Poland and Finland in the late 1920s displaced some recovering populations of European beaver and have expanded into parts of the Soviet Union.



Beaver range

Physical characteristics

The beaver is the largest rodent in North America and largest in the world except for the capybara of South America. An adult weighs from 16 to 32 kg and, including its 30-cm tail, a large beaver may measure 1.3 m long. Their ancestors were even larger. In the Pleistocene ice age—the era of the mastodons and mammoths—the giant beavers that inhabited the expanses of Eurasia and North America measured just under 3 m in length including tail and probably weighed 360 kg.

Very compact and rotund, a beaver walking on land appears to have no neck at all; the round profile of its head merges into the round profile of its back. Because its legs are short, it is ungainly and slow on land. When frightened, it can travel quickly in an awkward, bounding gallop, but over a distance of a hundred or so metres a person can run a beaver down.

Not so in the water. The beaver is a graceful, strong swimmer, both under water and on the surface, attaining speeds approaching 7 km per hour if alarmed.

It has many adaptations to its watery habitat. Its small beady eyes are able to see as well in the water as out of it thanks to a specialized transparent membrane that can be drawn over the eye for protection while diving. Its nostrils are small and can be closed for underwater swimming, and its ears too, can be closed under water.

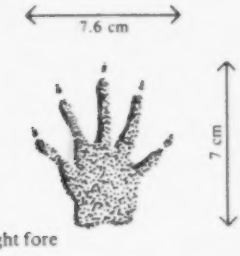
The beaver's tail has important uses both in the water and on land. The tail of a large beaver may be 30 cm long, up to 18 cm wide, and 4 cm thick. It is covered with leathery scales and sparse, coarse hairs.

In the water, the animal can use its tail as a four-way rudder. Although fat, the tail is flexible and muscular. When diving after being frightened, a beaver slaps the water with its tail, making a noise like a pistol shot, which warns all beavers in the vicinity that danger is near and perhaps serves to drive away potential predators.

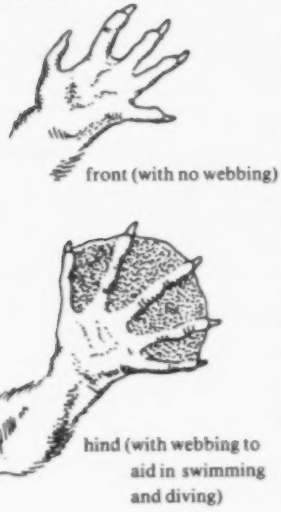
On land, the tail acts as a prop when the beaver is sitting or standing upright. It also serves as a counterbalance and support when the animal is walking on its hind legs while carrying building materials like mud, stones, or branches with its front paws.

The beaver's hind feet are very large, with five long blunt-clawed toes which are fully webbed, for swimming. In the water, a beaver uses only its hind feet to propel itself, with occasional aid from its tail. Its forepaws are

Beaver tracks



Beaver feet



small, without webs, and the toes end in long sharp claws suited to digging. These delicate paws are very dextrous—almost like hands—and with them the beaver can hold and carry sticks, stones, and mud and perform a variety of complex construction tasks.

The beaver also uses its paws to groom its coat. The second toe on each hind foot is double-clawed, the claws being hinged to come together like tiny pliers. These specialized claws on the hind feet along with the front claws are used for combing the fur.

The beaver has several reasons to groom itself. The dark brown fur is very dense, consisting of a mat of fine underfur about 2 cm long and an outer layer of heavy guard hairs 6–7 cm long. Through constant preening and oiling this dense pelt is kept waterproof. Even after swimming under water for six or seven minutes the beaver is not wet to the skin. Oil is obtained from two glands near the anus and, like preening, application of oil is done with both front and hind feet. Preening also removes dirt, straightens matted fur and removes mites and other insect parasites. Members of family groups spend considerable time preening each other.

Finally, the animal has exceptional teeth. Its long, sharp, strong incisors grow continuously and are hardened with a dark orange enamel on the forward face. Consequently, as the upper and lower incisors are ground against each other, the outer tips of these teeth are maintained chisel-sharp. With them, a beaver is able to fell very large trees. The lips can be closed behind the incisors, permitting the beaver to gnaw on twigs while under water.

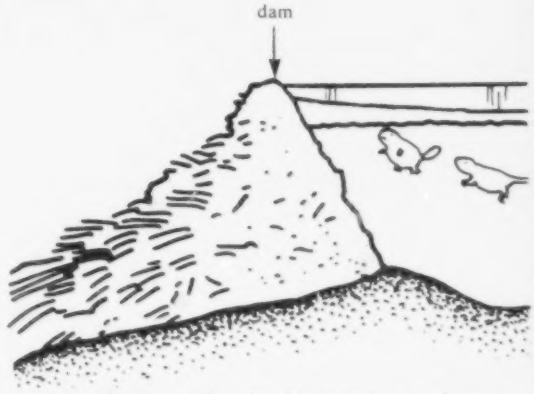
Engineering works

There are many false legends about the beaver, such as the one that credits it with the intelligence to fell a tree in a chosen direction, as would an expert lumberjack. In fact, a fair number of trees felled by beavers get hung up in adjacent trees and remain more or less upright. Early writings about the beaver insisted that the tail was used as a trowel. This is not so. It is the front paws that are used to plaster mud on dams and lodges.

The actual feats of the beaver are impressive enough that legends are not necessary. Beavers are wonderful builders and what they build depends on where they live. Their best-known structure, the beaver dam, is only built by beavers that need to enlarge the underwater habitat that will be open to them in winter, by creating a pond deep enough that it will not freeze to the bottom. Deep water, whether or not it is due to a beaver dam, provides storage for winter food and a year-round underwater access to the lodge or den secure from predators. Increasing the area of ponds through damming and additional downstream impoundments provides safer access to additional food supplies.

The beaver begins the dam by laying sticks and rocks in the stream bed about where the noise of moving water is greatest. Some sticks

Beaver lodge, food cache, and dam in winter



are embedded butt first in the bottom mud to serve as anchor prongs in the mud. Twigs, stones, and any other movable materials are laid in place in front of and around the initial rows of sticks. Eventually, mud is pushed up from the bottom or carried to the dam to provide a water seal. The result is a very stable earthwork that can withstand great water pressure and erosion by running water. Dams as high as 5.5 m have been discovered.

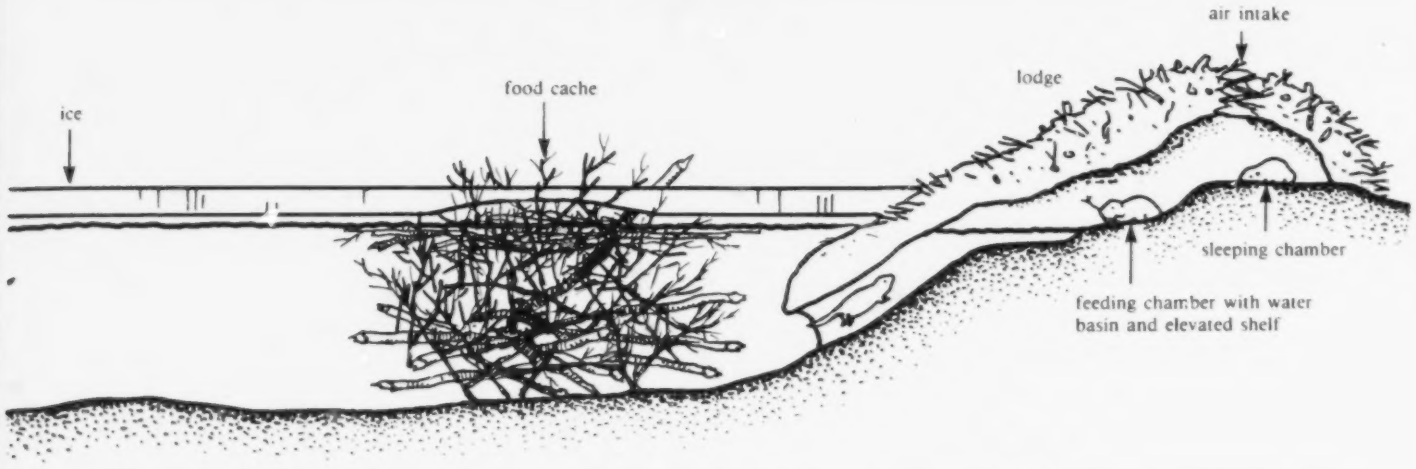
Dams are maintained throughout the year, but the beavers add most material during periods of high water. Breaks in dams are infrequent, probably because of daily inspection and maintenance.

A family of five or six beavers may require half a hectare of dense poplar trees for its winter food supply. As trees are cleared away from the edge of the pond, the beavers go farther afield in their logging operation—often 125 m or more from the pond. They cut down trees and shrubs, thus clearing "logging trails" so they can drag heavy sticks overland easily.

Another impressive feat of beavers is the building of canals. Canals may extend several hundred metres along the base of a wooded hillside. Often 1.5 m wide and 1 m deep, they provide easy transportation of food supplies. Sometimes canals are dammed to maintain the water level on uneven ground, and occasionally nearby streams are diverted into canals to maintain the water level.

Like many rodents, beavers construct nesting dens for shelter and for protection against predators. These may merely be burrows in a river bank or the more familiar lodges built in the water or on the shore. However, the basic interior design varies little and consists of one or more underwater entrances, a feeding chamber, a dry nest den, and a source of fresh air. The size of the lodge depends on the size of the family group, number of years of occupation, and fluctuating water levels. Most lodges are about 5 m in diameter and about 2 m high. Lodges 9 m in diameter have been discovered; these usually contain more than one nest den.

Lodges are mainly made up of tangled sticks, twigs, mud, and stones in which the tunnels



and chambers are then excavated. As freezing weather begins, the lodge is plastered with mud, except about the air intake near the top, making a concrete-like outer shell which no wolf, wolverine, or lynx can break through. On very cold winter days a steamy exhaust plume drifting from the highest point of the roof will indicate the beavers are at home.

Every fall, beavers in northern latitudes construct food piles to sustain them in winter. Each such cache is an accumulation of the beaver's favourite woody food items placed in deep water close to the lodge or bank den. The bulk of the edible forage in the cache is held below the water surface by a thick top layer of small, leafy branches most often cut from non-preferred trees and shrubs. The top layer then protrudes well above the water surface where it intercepts snow to provide an insulating cover that prevents water from freezing in and about the stored food. It is not uncommon to observe holes where curious elk or moose have fallen through the thin ice that covers a beaver's food cache.

Life history

A beaver takes only one mate, which it keeps for life. One litter, averaging three or four kits, is born each year in May or June following a 100-day gestation period. Although kits are well-furred, have teeth already cut, and can see, walk, and swim when born, they generally don't move out of the lodge for at least one month. They become capable of reproducing at age two. The young stay with their parents until they are two and sometimes three years old. At that time they disperse in response to an innate urge to leave the home colony, and migrate along streams or across country until they find mates and suitable building sites, whereupon they establish their own dams and lodge. These dispersal migrations can vary from just a few kilometres up to 250 km.

With the first frosts of September and October, the tempo of beaver life speeds up as the animals harvest their winter food supply. Trees are cut down, gnawed into short lengths, and toted to the pond for underwater storage. All winter the beavers bring sticks from their underwater cache into the feeding chamber of the lodge to gnaw the succulent bark. They prefer trembling aspen, poplar, willow, and birch. They also swim out under the ice and retrieve the thick roots and stems of aquatic plants, such as pond lilies and cattail. During mild winters and during warm days in March and early April, adult beavers emerge from their dull aquatic world to feed on fresh woody stems along the shore. On such forays they often fall prey to hungry wolves.

Beaver shift from a woody diet to a herbaceous diet as new growth appears in the spring. During summer, beaver will utilize grasses, herbs, leaves of woody plants, fruits, and aquatic plants.

Each day, beaver alternate periods of activity and rest. They are most active from dawn to dusk. Mid-day generally finds them in the den, be it summer or winter.

Although their aquatic habits offer excellent protection from predators, beavers are vulnerable in many ways. Beavers fall prey to wolves, coyotes, bears, lynx, and wolverine when foraging on shore or migrating overland. The river otter is able to enter the den via the water and kill the kits inside; however, an adult or subadult beaver always stays with the kits to offer protection. Sudden fluctuations in water levels can force beavers to leave their den and face danger on shore.

At bay, beavers stand their ground and protect themselves. They face the aggressor, rear up on their hind legs, and loudly hiss or growl before lunging forward to deliver extremely damaging bites. They should not be closely approached when cornered on land.

The beaver fur trade and beaver management

During the peak of the fur trade era some 200 000 pelts a year were sold to the European market, most being used to make the then-popular beaver hats. A large adult beaver skin yielded enough fur for 18 hats.

After the turn of this century, the trade in beaver declined, partly with the decline of the beaver hat as fashionable headwear, and partly

Tree gnawed by a beaver

because the beavers themselves were becoming scarce all over North America. Many large regions were completely without beaver during most of the first half of this century.

The beaver conservation movement began in the late 1930s with the writings and lectures of Grey Owl. A native of England who posed as a Métis, Grey Owl created passionate stories of the plight of the Canadian forests and wildlife, and particularly the beaver. Governments responded by closing the trapping seasons on beaver for many years.

More recently, conservation plans have been put into effect by the federal and provincial governments, with the co-operation of trappers. Beavers have been reintroduced into many areas that were stripped by early trappers. As a result of reintroductions and improved trapping laws, there has been a tremendous increase in the number of beaver in Canada. In fact, the age structure of the beaver population in the 1980s indicated that it was stable and near the carrying capacity for its available habitat. Regulations on trapping vary among the provinces and territories, but in all these jurisdictions records are kept of sales and exports of beaver pelts. These records prevent illegal trade and help in keeping track of the size of the beaver population.

In some areas the problem is not how to protect the beaver population, but how to prevent damage to farmlands, roads, and tree plantations. Trapping is an effective measure for controlling beaver density, as our historical records vividly attest. To control beaver damage from flooding in urban and agricultural areas, however, a combination of private trappers and use of flood control devices is necessary. A water-level control pipe can be inserted in a beaver dam and operated to stabilize the water at the level where the pipe is placed in the dam. To remove any dam material placed by beavers over a road culvert, a piece of flexible steel mesh with a chain attached can be placed over the culvert and pulled out periodically and cleaned. (See illustrations in *Nuisance beaver control* in the Reading List.) With these techniques the landowner may continue to enjoy the benefits of a wetland environment without having to eliminate the beavers in order to protect crops and property.

The multitudes of beavers on the headwaters of our major streams stabilize stream flow, prevent stream bed erosion, create trout ponds, and improve habitat for many forms of wildlife. They are nature's great conservationists and are valuable furbearers, as well as a source of food for trappers. They merit careful study and intelligent management.

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The Canadian Wildlife Service

The Canadian Wildlife Service of Environment Canada handles wildlife matters that are the responsibility of the Canadian government. These include protection and management of migratory birds as well as nationally significant wildlife habitat. Other responsibilities are endangered species, control of international trade in endangered species, and research on wildlife issues of national importance. The service co-operates with the provinces, territories, Canadian Parks Service, and other federal agencies in wildlife research and management.

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